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AEROCONTACT

AEROSPACE ENGINEERING

A newsletter for alumni and friends of the Department of Aerospace Engineering

INSIDE

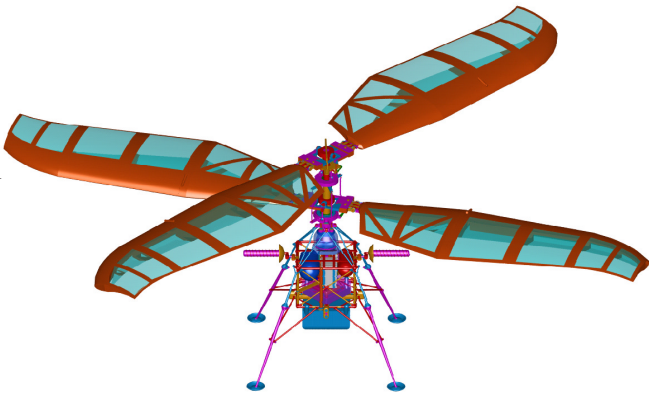
2 Message from the Chair
3 Department News
6 Faculty News
7 Current Research
8 Student News
10 Alumni News
12 Alumni Notes

Rotorcraft Center Graduate Students Win Helicopter Design Competition For Third Time

The American Helicopter Society together with NASA and the helicopter industry sponsors an Annual Student Design Competition. The competition for the year 2000 was the 17th in the series and was sponsored by Sikorsky Aircraft. The competition required the students to design an autonomous rotary wing vehicle for exploration of the planet Mars. The specifications called for a rotorcraft that could sustain controlled flight for a minimum of 30 minutes and have a range of at least 25 kilometers. The maximum mass of the vehicle was to be no greater than 50 kg. The student teams could choose to submit design for one or more of the following: vehicle design, propulsion system design, or flight control system design.

A team of graduate students from the AGRC, Anubhav Datta (team leader), Jinsong Bao, Dan Griffiths, Greg Pugliese, Jayanarayanan Sitaraman, Olivier Gamard, Lin Liu and Beatrice Roget, participated in the vehicle design competition and won the prize for the first place.

A rotary winged vehicle designed to operate on Mars faces some unique design challenges such as large variations in daily temperature, low gravity, low atmospheric density, and low oxygen levels. The low gravity on Mars implies that for the same vehicle mass, weight is one-third of that on earth. The atmospheric density on Mars is about one-hundredth of that on earth. For the same speed and characteristic dimensions, the Reynolds number on Mars is 0.019 times that on earth, whereas the Mach number is 0.7 times than that on earth. Mars has only 0.13% oxygen in its atmosphere with an atmospheric pressure of 0.0078 than that on earth. The temperatures on Mars can fluctuate in the range of -2020 F to 620 F. These offer challenges as well as opportunities for innovative airframe and power plant design.



(Figure 1)

Figure 1 shows the Martian Autonomous Rotary-wing Vehicle (MARV) designed by Datta and his colleagues. The geometry and the airfoils for the co-axial rotors were carefully developed to suit the unique low Reynolds

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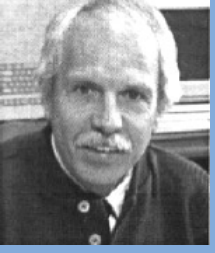


Message From the Chair

Greetings from the Department of Aerospace Engineering. The last AeroContact you may have received was in the Winter of 1998, and our department has been growing and progressing since that newsletter. For the 2001-2001 academic year, our undergraduate population stands at 254, with 123 graduate students. In fall 2000 our faculty size increased to 18, and this fall we have increased to 20.

Drs. Darryll Pines and Robert Sanner were promoted to the rank of Associate Professor, and Dr. Lewis was promoted to the rank of Full Professor effective July 1, 1999. Dr. Leishman was promoted to the rank of full professor effective July 1, 2000. Dr. Inderjit Chopra was selected as Chair of Rotorcraft Engineering after a national search. This position was made possible by a donation of $1.33 million by Jody Gessow, the son of Al Gessow, who was former department chair and was responsible for bringing the original Rotorcraft Center to Maryland. In appreciation for this contribution to the department, the rotorcraft center has been named the Alfred Gessow Rotorcraft Center for Education and Research.

Dr. David Schmidt left the department after taking a 1½ year leave, which started in the spring of 1998 at the University of Colorado at Colorado Springs. Dr. Anderson was on sabbatical leave with the Smithsonian Institute over the 1998-1999 academic year and retired effective July 1, 1999. He has been granted emeritus status and continues to teach for the department.

Our students in the Rotorcraft Center won seven of 11 Vertical Flight Foundation Fellowships from AHS for 1999 - five graduate students and two undergraduates. For 2000, of the 14 AHS Fellowships and Scholarships, eight were awarded to our students. Three were at the undergraduate level and five at the graduate level. In 2001, seven UM graduate students were awarded fellowships out of the 11 available. Two of our students received graduate awards from AIAA (Tim O'Brian's award was for his work in applied aerodynamics and Paul Samuel's award was for his work in adaptive structures). Ryan Starkey won the 1999 AIAA Abe Zarem award for the best paper in the AIAA hypersonics conference.

Brian Roberts, a graduate student in the SSL, developed a new type of wrench for use in space. It involves a mechanism that does not click like a normal ratchet wrench and therefore is of a more continuous nature rather than only being good for discrete movement. His wrench was tested aboard STS-95. Andy Bernhard, a graduate student in the Gessow Rotorcraft Center was selected to receive the 1999 AHS Francois Xavier Bagnoud Vertical Flight Award.

A student team from the Gessow Rotorcraft Center entered the helicopter design competition in 1999 and won first place nationally. They also entered the 2000 competition and again won first prize for their design of a helicopter designed to operate on Mars. This is the third year in a row that our graduate rotorcraft design team has taken first place. They were counseled by Dr. Chopra, Dr. Tishchenko, and Dr. Nagaraj.

Three of our research projects got media attention in 1999. The SSL was written up as an example of exciting research going on in academia. The Flight Dynamics and Controls Lab and their daily control of the SAMPEX satellite was written up in both the Washington Post and the Baltimore Sun. Finally, the part that Drs. Pines and Lewis and the Hypersonics Center here at Maryland played in the Hypersoar project at Lawrence Livermore appeared both in print (most of the major papers) and on National TV. Essentially, the calculations that proved the Hypersoar concept feasible were conducted here by Dr. Pines and a student (Lael Rudd).

Our research expenditures within the department were 7.25 million dollars for 1999. On average, each of the faculty members within the department supported 5 graduate students. This past year our research expenditures increased to 10.5 million dollars and our publication record again increased slightly. Over the past 10 years the research expenditures for the department have increased from 2.8 million to 10.4 million. Research expenditures in the department on a per faculty basis are higher than any other department in the college and equals any aerospace department in the country. In 1999 our faculty wrote 3 textbooks, 3 chapters in special topic books, 48 refereed journal articles, had another 22 journal articles accepted which had not yet appeared in print, and presented an additional 45 papers at major conferences around the world. We are pleased that Dr. Leishman's textbook on helicopter performance has appeared in print.The production of PhD's over the 1999-2000 academic year was 12 compared to a five-year average of about 6 per year. Twenty students received the MS degree in 1999 and eighteen in 2000. In the academic year 1999-2000 we were visited by ABET and given a full six-year accreditation.

The year 1999 was also our 50th Anniversary and we celebrated that milestone with two very important events. We held a banquet in September of 1999 at which we initiated 5 distinguished individuals into the Aerospace Academy of Distinguished Alumni. These five individuals were Glenn L. Martin Kevin Bowcutt, Michael Griffin, Gary Curtin, and Buz Hello. A second event to celebrate our 50th Anniversary was held on October 16, 2000 and was a day long seminar based around the theme of "What was the technological environment that made possible all of the great accomplishments in aeronautics and astronautics during the past century; and is the environment present to permit similar advances in the next century?" Norman Augustine, Hans Mark, Scott Crossfield, Max Faget, and Richard Whitcomb spoke at the seminar, which was moderated by Richard Hallion, Chief Historian of the USAF.

Once again we have recruited an excellent incoming freshman class. Sixty-six students joined the department in fall of 2000 as freshmen, and 70 joined in 2001. The average high School GPA of these freshmen is 3.86 and the average SAT was 1306. This makes the fifth year in a row that the SAT scores of our incoming class is 1306 or above. At the graduate level, the GRE scores for incoming graduate students in the fall of 2000 reached an all time high of 2103 with an average GPA of 3.68.

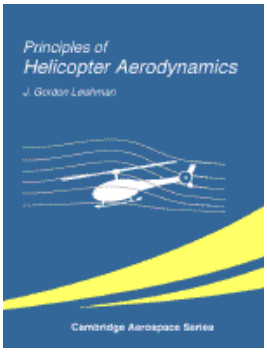
Norm Wereley was selected as the Associate Technical Editor of the Journal of Intelligent Material Systems and Structures and was also made a Fellow Chartered Physicist of the Institute of Physics of the United Kingdom. Dr. Anderson was elected to membership in London Royal Aeronautical Society and Dr. Chopra was elected as a Fellow to the Indian Aeronautical Society. Drs. Leishman and Vizzini were appointed as Associate Editors of the Journal of the American Helicopter Society.

It has been a productive three years for the department and I hope that you will enjoy the details on the department that are given in this newsletter.

Dr. William Fourney

departmentNEWS

Dr. J. Gordon Leishman Publishes Textbook on Helicopter Aerodynamics



In June 2000, Cambridge University Press published Professor Leishman's textbook "Principles of Helicopter Aerodynamics," which provides a thorough, modern treatment of the aerodynamic principles of helicopters and other rotating-wing vertical lift aircraft. Before coming to the University of Maryland in 1986, Professor Leishman was an aerodynamicist at Westland Helicopters, Ltd., and is the author of many articles on helicopter aerodynamics.

The first part of Professor Leishman's book begins with a technical history of helicopter flight, and then covers basic methods of rotor aerodynamic analysis and related issues associated with helicopter performance and aerodynamic design. The second part is devoted to more advanced topics in helicopter aerodynamics, including the analysis and modeling of airfoil flows, unsteady aerodynamics, dynamic stall, and rotor wakes.

Every chapter in Professor Leishman's book is heavily illustrated, and concludes with a full up-to-date bibliography and a set of homework problems. An Instructor's Manual is available, which provides solutions to the problems. The book is aimed at advanced undergraduate and graduate students, as well as practicing engineers and researchers, who will welcome this thorough and modern text on helicopter aerodynamics.

University of Maryland Aerospace Engineering student, Matthew Tarascio, had the following to say about Professor Leishman's book: "A must have for all rotorcraft engineers. As an aerospace engineer I have read many books on rotorcraft and I must admit that this [was a] pleasure to read. There are many aspects of the text that stand out, however the one I found most useful, especially as a graduate student, was that the equations are derived from engineering basics and are accompanied by clear explanations of the principles involved. The text and equations are also supplemented by clear diagrams that serve to enhance understanding of the more complex topics covered. All in all a great book and one that I would highly recommend to both rotorcraft students and practicing engineers alike."

Dr. Jewel Barlow Co-Authors Book on Low-Speed Wind Tunnel Testing

Written by authors who are among the most respected wind tunnel engineers in the world, this edition was updated to address current topics and applications, and includes coverage of digital electronics, new instrumentation, video and photographic methods, pressure-sensitive paint, and liquid crystal-based measurement methods. Already considered a classic book in the field, Dr. Barlow was originally asked to contribute to a section on data quality for the planned Third Edition. However, following Bill Rae's death in 1992, Prof. Barlow was approached by Alan Pope to undertake the production of the Third Edition. This involved a substantial rewriting and reorganization of the Second Edition. The book is organized for quick access to topics of interest, and examines basic test techniques and objectives of modeling and testing aircraft designs in low-speed wind tunnels, as well as applications to fluid motion analysis, automobiles, marine vessels, buildings, bridges, and other structures subject to wind loading.

The book is supplemented with real-world examples throughout, and is an indispensable resource for aerospace engineering students and professionals, engineers and researchers in the automotive industries, wind tunnel designers, architects, and others who need to get the most from low-speed wind tunnel technology and experiments in their work.

Two of Prof. Barlow's students drafted the Chapters 14 and 15. Chapter 14, drafted by Rui Guterres, deals with special application of wind-tunnel testing to ground vehicles, and Chapter 15, drafted by Daniel (Rick) Harris, discusses marine vehicles, including sailboats.

Roger L. Simpson, Virginia Polytechnic Institute and State University, reviewed the book for the AIAA Journal and stated: "The third edition of this book has been substantially expanded by a new coauthor, Jewel B. Barlow. It is clear that Barlow, who is a scholar of low-speed wind-tunnel testing, has drawn upon his many years of experience for his contributions to this book. Much practical information is shared in this well-written and well-organized book. Every low-speed wind-tunnel engineer should have access to a copy."

staffNEWS

Ms. Rebecca Sarni, the department's Executive Administrative Aide, has received the Clark School of Engineering Non-Exempt Employee Award. This is the second consecutive year she has won this award, and the third time in five years. The department congratulates her hard work and dedicated commitment to the students, faculty and staff.

continued from page 1

number/high subsonic Mach number in which the vehicle has to operate on Mars. Each rotor blade is capable of being folded at two stations, thus allowing compact storage during travel to Mars. On Mars, the blades self-deploy and snap into place, keeping their extended position. The landing gear is retractable to reduce storage space. The power is from a proton exchange membrane fuel cell power plant. This uses hydrogen and oxygen as fuel.

The students were advised by Prof. Inderjit Chopra, Prof. Alfred Gessow, Dr. Marat Tishchenko and Dr. Vengalattore Nagaraj.

This is the third consecutive year that the student teams from Maryland have won the first place in the AHS/NASA/Industry student design competition.

Want more info? Visit http://www.enae.umd.edu/AGRC/Design00/MARV.html

First row (standing) - Beatrice Roget, Daniel Griffiths, Dr. V.T. Nagaraj, Prof. Tishchenko (Mil Design Bereau, Moscow), Olivier Gamard, Greg Pugliese, Jinsong Bao; Second row (sitting) - Jaina Sitaraman, Lin liu, Anubhav Datta

Alfred Gessow Rotorcraft Center Shines With Accomplishments

Rotorcraft Center Renewal

In September 2000, the Alfred Gessow Rotorcraft Center (AGRC) was awarded a $4.6M grant by the joint Army/NASA National Rotorcraft Technology Center (NRTC). This renews the university's standing as one of only three rotorcraft Centers of Excellence in the nation. This award to the AGRC funded 15 of the 21 proposed research projects, which was the greatest number among the rotorcraft centers. The objective of the NTRC effort is to advance understanding, improve predictive capability, and pursue opportunity-driven concepts in rotorcraft technology. Research under the grant will be in the areas of noise reduction, superior rotor performance miniaturization, vibration reduction, improved power transmission, smart structures, flight controls, and air traffic management (see sidebar). The advancements in these technologies are expected to be applied directly toward developing more efficient, reliable, and cost-effective military and commercial rotorcraft. This grant, the fourth renewal since the U.S. Army began establishing rotorcraft Centers of Excellence in 1982, will cover efforts from January 2001 to December 2005. The award followed six months of intensive work preparing the proposal, which was closely examined by a panel of experts from government and industry. Competition was fierce, with nearly 20
Universities fighting for funds.

Smart Structures MURI Comes To Completion

A Multidisciplinary University Research Initiative (MURI) entitled "Innovative Smart Technologies for an Actively controlled Jet-Smooth Quiet Rotorcraft" was completed in July 2001. This was a major Army sponsored five-year research program, and was carried out in collaboration with Penn State and Cornell University. At Maryland, a considerable research effort was focused towards the development of a smart rotor system to minimize helicopter vibration. This methodology is equally applicable to other problems such as aeromechanical stability augmentation, handling qualities enhancement, stall alleviation, reduction of interior/exterior acoustic signatures, minimization of blade dynamic stresses and rotor head health monitoring.

Rotorcraft Aerodynamics Group Awarded

Preston Martin, graduate research assistant pursuing a Ph.D., and the Rotorcraft Aerodynamics Group consisting of Gregory Pugliese, Graduate Research Assistant, and Prof. J. Gordon Leishman, were awarded the Tecplot Image of the Month for September 2000 for their Particle Image Velocimetry images of a rotor wake. Tecplot is a plotting and visualization software that allows engineers to create and publish presentation-quality plots ranging from XY graph to 3-D visualization of large data sets according to Martin. The goal of the project associated with their plot "Helicopter Rotor Wake in Hover," is to investigate the flow physics associated with the vortex wake of a hovering helicopter rotor. A secondary goal is to assess the advantages and limitations of phase-resolved stereo Particle Image Velocimetry (PIV) in resolving the rotor tip vortex structure and its evolution in time. The data was acquired during a cooperative effort between the University and TSI, Inc. Take a look at: http://www.amtec.com/Product_pages/martin.html (Information for this article was obtained from the Amtec web site at www.amtec.com)

Space Systems Laboratory

During the last two years, the Space Systems Laboratory, its students and faculty, have received its share of honors and awards.

In April 1999, Brian Roberts, Faculty Research Assistant, placed 3rd in the graduate division at the AIAA Middle Atlantic Regional Student Conference paper and oral presentation competition for his paper entitled "Development of a 'Ratchetless' Wrench for Extravehicular Activity."

In the 1999-2000 academic year, Prof. Akin's graduate Space Exploration Robotics class (ENAE 788U) was awarded first place in the graduate division at the 2nd Annual Human Exploration and Development of Space - University Partners Mars Exploration Forum for the group design of an astronaut assistant rover.

SSL Graduate Student Jamie Lennon was awarded a National Science Foundation Graduate Research Fellowship in April 2000. It is for 3 years of funding. She was also awarded a National Defense Science and Engineering Graduate Fellowship Program award, but decided to take the NSF fellowship instead.

In September of 2000, Brian Roberts placed second in the graduate category of the Year 2000 ASME Student Mechanism Design Competition held at the 26th Biennial Mechanisms and Robotics Conference. The title of the paper was "Evaluation of a Three-Dimensional Roller Clutch Reversible Hand Socket Wrench for Extravehicular Activity."

In April 2001, the SSL Graduate Students received the 1st place Golden Geese Award "in recognition of their extraordinary concern for and support of each other" from the Division of Research and Graduate Studies at the University of Maryland.

This past May, Profs. Akin's and Bowden's undergraduate Space Systems Design Class (ENAE 484) won second-place in the NASA HEDS-UP advanced design Competition for their project "Clarke Station: Learning to Live and Work in Deep Space." This consisted of a 15 page summary paper, a poster presentation, and an oral presentation. The four member undergraduate team, consisting of Dominic dePasquale, Jessica Garzon, Kevin Stefanik and Eric Simon, and the four member graduate team of Mike Flanigan, Paul Frontera, Greg Shoup and Corinne Segalas, traveled to Houston for the conference.

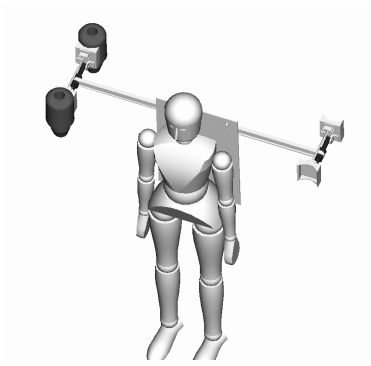
In August of this year, Dr. Craig Carigan, Dr. Corde Lane, and Dr. Dave Akin received an outstanding paper award from AIAA for their paper titled "Real-Time Simulation of a Free-Flying Robotic Vehicle" at the AIAA Modeling and Simulation Technologies Conference in Montreal, Canada.

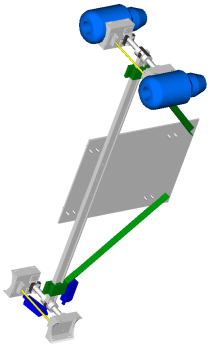
Small Smart Systems Center (SSS)

The SSS has become a vibrant organization initiating research activities on many fronts in support of its mission and developing strong linkages with exiting research laboratories, centers and institutes from across the campus. Current research includes such programs as a Small-Scale Propulsion for Jump Augmentation. Methods of enhancing a soldier's jumping ability along with generating kilowatt levels of electrical power for body armor systems are research issues. Dr. Mark Lewis and research assistant Peter White, are part of the DARPA Exoskeleton for Human Performance Augmentation program. Leg/joint augmentation and conventional propulsion systems were the two chief options considered. It was quickly decided that the project goals could best be achieved through the use of a conventional propulsion system since electrical power could be readily generated from the engine. From this starting point, rotor-based systems, gas turbine-based systems, and rockets were evaluated in order to determine the best method of providing short bursts of enhanced jumping capability. Generally, rotor based systems are very fuel-efficient but have relatively high structural weight. This is an optimum solution if the jumping time is sufficiently large. On the other end of the spectrum are rockets, which are relatively lightweight structurally but fuel inefficient, making even short duration systems heavy with fuel. In between these two options is the gas turbine (turbojet engine), which is structurally heavier than the rocket but significantly more fuel-efficient.

Many of these concepts were explored in 1950's and 1960's by the U.S. military with the goal of providing short duration flight from a staging area to the battlefield. Today's mission is to provide jump enhancement, instead of free flight, with a total operating time at full power on the order of seconds. Combining this with today's small scale gas turbine technology may allow for the creation of a pack weighing as little as 40 lb.

A second-generation jetpack design is likely to use lighter carbon-based materials and improved exhaust heat protection for the wearer, thus allowing the engines to be placed more closely. Several operational issues are being studied in the mean time. These include engine starting, exhaust heat mitigation, noise suppression, and modifications for electrical power generation from the engine.





The University of Maryland Jetpack Project will study propulsion technologies for personal flights units, to enable individual soldiers to scale high obstacles in body armor. The program will look at available options, technical challenges, and key technology advances that will be required for the effective design and operation of propulsion packs that are field deployable, robust and operate with existing support infrastructure.

New Faculty

Ella Atkins

Dr. Ella M. Atkins is currently an Assistant Professor in the Aerospace Engineering Department. Dr. Ella M. Atkins obtained S.B. (1988) and S.M. (1990) degrees in Aeronautics and Astronautics from MIT, where her research focused on implementing a multi-processor control system for a free-flying robotic vehicle designed for neutral buoyancy simulation experiments. She worked as a structural dynamics testing and software engineer at the Structural Dynamics Research Corporation (SDRC) from 1990 to 1993 where she performed analysis and modal tests on aerospace systems including Pegasus and Taurus launch vehicles, the MD-90 aircraft, and composite optics devices. Dr. Atkins received her Ph.D. (1999) from the University of Michigan in Computer Science and Engineering with a specialization in Intelligent Systems. She was a member of the Artificial Intelligence and Real-time Systems Laboratories, where she worked to develop the Cooperative Intelligent Real-time Control Architecture (CIRCA) and demonstrate fault-tolerant, autonomous flight of a single aircraft in simulation. While at Michigan, she participated in the Aerospace Engineering Department's Uninhabited Aerial Vehicle (UAV) project from design through flight tests.

Prof. Atkins has funded research in autonomous satellite formation flying, rotorcraft airspace planning to minimize conflict potential and ground noise, and autonomous flight management system response to in-flight failures. She co-founded the University of Maryland Autonomous Vehicles Lab (AVL) (2000) and is an active advisor within the University of Maryland Space Systems Laboratory and Alfred E. Gessow Rotorcraft Center of Excellence. Dr. Atkins co-chaired the AAAI-2001 Spring Symposium on Robust Autonomy and is a program committee member for the AAAI-2002 Spring Symposium on Safe Learning Agents.

Christopher Cadou

Dr. Christopher Cadou is an Assistant Professor in the Aerospace Engineering Department. Dr. Cadou earned two Bachelors degrees from Cornell University in Mechanical Engineering and History, and subsequently the M.S. and Ph.D. in Mechanical Engineering from the University of California at Los Angeles. His work at UCLA focused on making time-resolved measurements of temperature and concentration fields in unsteady (acoustically excited) reacting flows using Planar Laser-Induced Fluorescence, a non-intrusive laser diagnostic technique. Upon graduation, he took a post-doctoral position at the California Institute of Technology's Jet Propulsion Center where he investigated the stability of boundary layers in supersonic flow under conditions corresponding to SCRAMjet inlet unstart. These experiments were performed in the GALCIT supersonic wind tunnel and yielded Schlieren images of various phases of the inlet unstart process resulting from a perturbation to the subsonic-boundary layer. Dr. Cadou left Caltech in 1998 to join the Gas Turbine Laboratory at the Massachusetts Institute of Technology where he worked on the development of a micro-gas turbine engine. While at MIT, he worked to develop micro-turbomachinery operating at up to 2.5 million RPM and micro-combustors with power densities exceeding 2 MW/m^3. The work at MIT was multi-faceted and included large and small-scale experiments related to the design of micro-compressors and combustors, as well as analytical work to study the fundamental physics underlying the observed performance of these devices. In 2000, Prof. Cadou left MIT to join the University of Maryland faculty in the department of Aerospace Engineering and the Center for Small Smart Systems. His immediate research interests include the development of micro-combustors and micro-reactors, the study of fluid-structure coupling that occurs very strongly at small scales, micro-air vehicles with appropriate micro power plants, and the development of compact, piezo-driven fluid actuators. He is also interested in environmental aspects of combustion and conventional-scale propulsion systems. At present, Dr. Cadou has two funded research projects supporting two graduate students. One, funded through the Air Force Office of Scientific Research, investigates the fundamental physics of combustion in small passages for micro-rocket applications. The other project, funded through the Defense Advanced Research Projects Agency and CSA Inc., seeks to develop a new class of hydraulic actuator that incorporates piezoelectric smart materials. As one member of a team of investigators, Dr. Cadou leads the fluid modeling efforts.

Prof. Fourney received the 2000 Society for Experimental Mechanics, Inc.'s F.G. Tatnall Award for long and distinguished service to the Society.

Prof. Darryll Pines received the E. Robert Kent Outstanding Teaching Award for Junior Faculty from the A. James Clark School of Engineering. This award is based on appraisals by colleagues and students, and honors significant contributions to teaching. He also placed 2nd place in the AIAA National Capital Young Engineer of the Year Award.

Profs. James Baeder, Darryll Pines, and Norman Wereley were promoted to the rank of Associate Fellow of the American Institute of Aeronautics and Astronautics.

Prof. Fred Schmitz was promoted to the rank of Fellow of the American Institute of Aeronautics and Astronautics.

Prof. Norman Wereley was promoted to the rank of Fellow and Chartered Physicist of the Institute of Physics.

Prof. Inderjit Chopra was honored with the Vice President Al Gore's Hammer Award as part of the Rotorcraft Center of Excellence. This award is presented to teams of federal employees who have made significant contributions in support of reinventing government principles.

Prof. Mark Lewis was appointed to the U.S. Air Force Scientific Advisory Board.

Pictured at the Alfred Gessow Rotorcraft Center are (left to right): Ella Atkins, Inderjit Chopra, Norman Wereley, Dean Nariman Farvardin, Mrs. Elaine Gessow, Darryll Pines, President Dan Mote and Alfred Gessow

current RESEARCH

Dr. Anthony Vizzini, Director of the Composites Research Laboratory (CORE), is working with NASA Goddard and Maryland Company Mega Engineering to manufacture space-quality composite panels for analysis of the Hubble telescope. He is also designing a light-weight composite skirt to hold propellant tanks on upcoming Mars Micromissions. Prof. Vizzini is working with Carlton Technologies, Pressure Technology Division in Maryland which is the NASA Jet Propulsion Laboratory contractor for the project. On June 30, 2001, a Delta II carrying the Microwave Anisotropy Probe (MAP) was launched from Cape Canaveral. Its mission is to chart minute differences in the microwave cosmic background radiation created a split second after the Big Bang. The spacecraft was developed by the department's friends at NASA Goddard. The CORE lab was instrumental in fabricating several components on the spacecraft, in particular: Battery cover, Substrate Ground Plane, Solar Blanket Stiffeners (minimizes the effects of the satellite spinning on the solar blanket), RXB Substrate Closeout (panel separating the internal and external portions of the satellite) and the Material Recertification Test Specimens (used to qualify the existing materials for space flight). The CORE Laboratory was able to provide NASA Goddard with quick, economical, and precision manufacturing. Although the CORE lab has been involved in several programs in the past, this is clearly a first in the amount of flight hardware within the laboratory.

Prof. Norman M. Wereley has returned from his sabbatical year during which he developed a new nanotechnology research initiative in the area of magnetorheological (MR) nanofluids. These novel fluids are a suspension of 10-30 nanometer size pure iron particle in a carrier fluid. He is collaborating with Materials Modification Inc. (Fairfax, VA) under the sponsorship of the National Science Foundation to develop these MR nanofluids. The pure iron powders are manufactured by MMI using a microwave-based process to develop iron and iron alloy powders, and then suspended in a carrier fluid. The field dependent and shear rate dependent rheological properties of the MR fluids are characterized in the Smart Structures Laboratory. These fluids are then applied in shock absorbers, clutches, and isolators for commercial and military applications. The Air Force Office of Scientific Research (AFOSR) has also provided a grant to study the magnetorheological effects of ferroelectric nanofluids, and General Dynamics provided support to look at wear characteristics of MR nanofluids.

Undergraduate

Jennifer Aloi and Delaney Riehle under the mentorship of Dr. Jewel Barlow, and ***Glen Dimock and Nicholas Rosenfeld*** under the mentorship of Dr. Norman Wereley, were honored with ASPIRE Research Scholarships in September 2000.

Glen Dimock was chosen as the Senior Summer Scholar in October 2000 from the A. James Clark School of Engineering. He also attended the 2001 AIAA Mid-Atlantic Region I Student Conference this past April where he received first place in the undergraduate division and is invited to the national conference in Reno, Nevada.

The following Aerospace Engineering awards were given at the annual A. James Clark School of Engineering Honors and Awards Ceremony in April, 2001: ***Matthew Ashmore and Eric Simon*** received The Academic Achievement Award; ***Jason Pereira*** received The American Institute of Aeronautics and Astronautics Outstanding Achievement Award; ***Daniel Shafer*** was presented The Robert M. Rivello Scholarship Award; and ***Kevin Turner*** was presented with the Sigma Gamma Tau Outstanding Achievement Award. ***Glen Dimock*** received The Outstanding ASPIRE Student Research Award by the Engineering Research Center, as well as The A. James Clark School of Engineering Dean's Award.

Graduate

Brian Roberts placed second in the 2000 ASME Student Mechanism Design Competition for his thesis on "Evaluation of a Three-Dimensional Roller Clutch Reversible Hand Socket Wrench for Extravehicular Activity." The competition took place at the 26th Biennial Mechanisms and Robotics Conference in Baltimore.

Sadie Michael was selected as one of 16 Research Associates for the summer 2001 NASA Academy at the Goddard Space Flight Center (GSFC).

Kezia Tsang won the Society of Women Engineers regional technical presentation competition for her paper "Functions for Elastomeric Lag Dampers." She was invited to present her study at the national conference in Denver, Colorado. At the annual A.J. Clark School of Engineering Honors and Awards ceremony, she also was presented with The Women in Engineering Service Award.

Marc Gervais was honored with AHS International Vertical Flight Society's FORUM 57 Best Paper Winner for his paper "Tiltrotor Blade-Vortex Interaction (BVI) Noise Control Through Non-Unique Longitudinal Force Trim." He was invited to present at the Society's 57th Annual Forum & Technology Display in Moscow, Russia. This paper was also selected as the recipient of the Robert L. Lichten Award.

Gaurav Gopalan has been selected as this year's Initiative 21 Joseph P. Cribbins scholarship recipient by the Federal City Chapter of AHS. He also was one of 10 selected for the AIAA Foundation Graduate Award for Studies in Flight Path Management and Control Methodologies for Rotorcraft. He will receive the award at the 40th AIAA Conference in Reno, Nevada next January.

The following students were awarded scholarships from the Vertical Flight Foundation:

1999
Undergraduate Student:
Megan P. Rooney

Graduate Students:
Mahendra J. Bhagwat, Paul Samuel, Matthew J. Tarascio, Rebecca A. Snyder, Mustapha Chehab, Jason Lindler and Rebecca Snyder

2000
Undergraduate Students:
Glen Dimock, Jason Pereira

Graduate Students:
Mustapha Chehab, Preston B. Martin, Harsha Prahlad, Ashish Purekar, Paul Samuel, Jayant Sirohi

2001
Graduate Students:
Jinsong Bao, Matthew Tarascio, Jason Pereira and Beatrice Roget, Nicholas Rosenfeld

Students and Faculty enjoy an evening of fellowship at the 8th Annual Aerospace Department Banquet held at the 94th Aero Sqaudron.

Student Society News

AIAA
American Institute of Aeronautics and Astronautics

University of Maryland at College Park Student Branch

The AIAA student chapter at the University of Maryland has continued to grow, with 74 undergraduate members in 1999-2000 and 82 in 2000-2001, freshmen constituting 40 of the latter.

In Fall 2000, AIAA held 3 general member meetings, with Dr. Robert Lindberg, Senior Vice-President, Orbital Sciences Corp., Sam B. Wilson, DARPA TTO Program Manager, Aeronautic Systems Division, and Dr. Ron Turner, principal physicist, ANSER, Inc., as guest speakers. Other activities included an "AIAA Movie Night," the Aerospace Department Fall Picnic, an annual barbecue and get-together for the faculty, staff and students of the Aerospace Engineering department co-hosted with Sigma Gamma Tau, the Aerospace Engineering Honor Society, at Paint Branch Park.

Members went on a trip organized by Sigma Gamma Tau to the National Air & Space Museum's Garber Preservation, Restoration and Storage Facility in Suitland, MD. The AIAA/SGT student lounge continues to be the favorite hangout of the aerospace engineering students. Last year, the lounge doubled as a wood-shop for the construction of an aerospace-themed miniature golf course for the Maryland Day "Engineering of Golf" display/activity.

The 8th Annual Aerospace Department Banquet was held in the Spring, which AIAA co-hosts with SGT. At this banquet that Dr. Fourney, the department Chair, gives his annual "State of the Department" address. The following faculty awards were presented by the students: the Professor Of The Year Award went to Dr. Fourney, and the infamous Broken Propeller Award was given to Dr. Celi.

So far this year the AIAA student branch has participated in the Engineering Welcome Back Picnic sponsored by the Engineering Student Council, held in September on the front lawn of GLM Hall. The Picnic was a collection of the Engineering Student Societies where they were able to recruit several new members. As a primary fund-raiser, AIAA sells hot dogs throughout the semester and anticipate a better turnout each time. Mr. Ron Davies from the Smithsonian's National Air and Space Museum was the guest speaker at the October meeting.

The new officers for the 2001-2002 academic year are Chairman: Matt MacKusick, Vice-Chairman: Dan King, Treasurer: Justin Richeson , Secretary: Jesse Colville; Faculty Advisor: Dr. Mark Lewis. Please visit their web site at: http://www.enae.umd.edu/AIAA/ for upcoming events and contact information.

Sigma Gamma Tau
National Honor Society in Aerospace Engineering

Sigma Gamma Tau, the National Honor Society in Aerospace Engineering, was established in 1953 to "recognize and honor those individuals in the field of aeronautics and astronautics who have through scholarship, integrity, and outstanding achievement been a credit to their profession." The Society seeks to create higher standards of ethics and to create a spirit of camaraderie among students of Aerospace Engineering.

The University of Maryland Chapter of Sigma Gamma Tau was founded in 1962, and has been an active organization ever since. Hundreds of outstanding Aerospace students have been inducted throughout the years, and the chapter currently maintains a large membership of 35 students.

In recent years, Sigma Gamma Tau has co-sponsored a number of activities with the local chapter of the AIAA, including the Fall and Spring Picnics and the Aerospace Banquet, and has participated in such activities as E-Week and Maryland Day. Last year's popular entry into the Maryland Day competition resulted from the hard work of many Sigma Gamma Tau electees.

This year, the chapter hopes to be more active than ever before. In addition to our usual activities, we will hold a few General Body meetings, where we will show videos and serve refreshments, in addition to discussing various local issues and ways we could improve our chapter. To support our chapter, we are currently selling Aerospace Engineering t-shirts, with polo shirts soon to follow. We also plan to sponsor a few intramural sports teams with the AIAA, and we will be selling hot dogs all semester in the lobby of the Engineering Building. We thank you for your support of Sigma Gamma Tau, and promise to do our best to make our school proud.

Sincerely,
Joseph M. Simons
President

AIAA and SGT members speak with students at the Welcome Back Picnic held in September.

Aerospace Engineering's Academy of Distinguished Alumni is Inaugurated

In the Fall of 1999, the Department of Aerospace Engineering inducted four graduates as well as aviation pioneer Glenn L. Martin into its Academy of Distinguished Alumni. The academy recognizes alumni who have made notable contributions to the field of aerospace engineering and/or achieved other significant accomplishments.

GLENN L. MARTIN - Honorary Award

Aviation pioneer Glenn L. Martin was instrumental in providing funding to support education in the aeronautical sciences at the University of Maryland. In recognition of his philanthropic gifts and pioneering spirit in the field of aeronautics, the University of Maryland in 1949 designated the College of Engineering as the Glenn L. Martin College of Engineering and Aeronautical Sciences. This name again changed in 1955 when the engineering building and those of chemistry, mathematics and physics were designated the Glenn L. Martin Institute of Technology.

KEVIN BOWCUTT
B.S '82, M.S. '84, Ph.D. '86

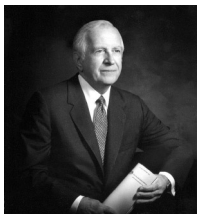
Kevin Bowcutt is chief scientist of hypersonics with the Boeing Co., in Long Beach, California. Bowcutt has been with Boeing (formerly Rockwell International, North American Aircraft) since 1986 and was named a senior technical fellow by Boeing in 1998. Much of his professional career has involved research in and development of airbreathing hypersonic vehicles, including missiles, aircraft and space launch vehicles.

GARY L. CURTIN
MAJ. GEN. U.S. AIR FORCE (Ret.), B.S. '65

Gary Curtin is senior vice president with the Defense Group Inc. In 1998, Curtin retired with the rank of major general after 33 years of service with the U.S. Air Force. His military career included duties with intercontinental ballistic missile operations, command and control, military intelligence and political/military affairs. Curtin was assigned in 1989 as the senior U.S. military representative to the Strategic Arms Reduction Talks (START) in Geneva, Switzerland, and was instrumental in negotiating the START I Treaty signed in 1991.

MICHAEL D. GRIFFIN
Ph.D. '77

Michael Griffin is executive vice president and chief technical officer with Orbital Sciences Corporation, in Dulles, Virginia. Prior to joining Orbital in 1995, he served as senior vice president for program development at Space Industries International as well as general manager of Space Industries in Houston, Texas. He supported numerous space missions while working at Computer Sciences Corporation, the Johns Hopkins Applied Physics Laboratory and the Jet Propulsion Laboratory.



BASTION "BUZ" HELLO
B.S. '48

Although semi-retired, Bastian "Buz" Hello is still an active management consultant to Rockwell International Corporation. His distinguished career at Rockwell includes management of strategic military aircraft programs as well as making important contributions to America's space efforts. He was responsible for pre-launch preparation and launch support for six Apollo missions that included three successful moon landings.

JEFFERSON GOBLET AWARD GIVEN TO UM ALUMNI

Rebecca (nee Snyder) Grilli (BS'99, MS'01) presented her MS thesis research entitled "Mechanisms-based Analysis of Elastomeric Lag Damper Behavior Under Single and Dual Frequency Excitation." at the 42nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference in April 2001 held in Seattle Washington. This research was sponsored by, and was a collaboration with, Paulstra Industries Inc. of Carlsbad, California.

Ms. Grilli was awarded the prestigious Jefferson Goblet Award for the outstanding quality of her presentation of this research at the national conference. While an undergraduate student, Ms. Grilli conducted research into hysteresis modeling of magnetorheological dampers, which was published by the AIAA Journal in July. She was twice awarded the internationally prestigious Vertical Flight Foundation Scholarship in two national competitions in subsequent years, and was awarded an ASPIRE scholarship. She also co-authored a chapter on helicopter damping for the three volume Encyclopedia of Vibrations.

Ms. Grilli, shown being congratulated by her co-author and advisor Prof. Norman M. Wereley, graduated in May of 2001 with her MS degree, and is currently developing magnetorheological recoil adaptors for the Apache helicopter as member of the Smart Structures Group of Systems Planning and Analysis (Greenbelt, Maryland). She was recently married to Justin Grilli in July 2001 at a ceremony in Pennsylvania.

Ms. Grilli is another fine example of the accomplished researchers in the Smart Structures Laboratory of the Alfred Gessow Rotorcraft Center.

We'd Like to Hear From You!

We want to know where life has taken you since you left the University of Maryland. Please complete the form below, including any additional comments. Also send the address of any Aerospace Engineering Alumni you know who are not receiving the Aerospace Engineering AEROCONTACT.

FIRST NAME | MIDDLE INITIAL | LAST NAME

DEGREE(S) | GRADUATION YEAR(S)

HOME ADDRESS

CITY | STATE | ZIP+4

POSITION TITLE

FIRM ADDRESS

CITY | STATE | ZIP+4

BUSINESS PHONE | FAX NO. | E-MAIL

Alumni News:

Please send to:
Editor, AEROCONTACT
Aerospace Engineering Department
University of Maryland
College Park, MD 20742-2111

You can also go online at www.eng.umd.edu/alumni. Click on Alumni Information Update to let us know what you are doing.

90's

John Hansen, BS '95, MS '97, is Technical Director and computer graphics animator at Industrial Light & Magic, which is George Lucas' special effects group. Over the past year, his focus has been on the simulation and rendering of fluids including water, smoke and fire. Hansen's latest project involves running water shots for Star Wars: Episode II. Before that, he worked on the optimization of water splash rendering and the development of a volumetric smoke rendering pipeline for Jurassic Park III. He also worked on the Star Wars: Episode I DVD early last year.

Brian Harkless, MS '97, has been recently promoted to Senior Structural Engineer at DynCorp in Forth Worth, Texas, where he is developing novel methods for composite bonded repairs for such advanced military aircraft as the F-16, and C-141, as well as helicopters including the CH-47 and AH-64. He has written or co-authored several papers presented at industry conferences and has contributed two articles for an upcoming edition of a bonded repair design book.

Michele Foster, BS '91, MS '92, and Ph.D. '97, is now the Executive Assistant to the Associate Administrator of Aerospace Technology at NASA in Washington, D.C.

00's

Andreas Bernhard, Ph.D. '00, was granted the Francois-Xavier Bagnoud by the AHS International Vertical Flight Society in 1999. He is a Dynamicist working in the Dynamics Group, which is part of Aircraft Sciences at Sikorsky Aircraft in Stratford, CT.

Nikhil Koratkar, Ph.D. '00, is Assistant Professor in the Department of Mechanical, Aerospace and Nuclear Engineering at Rensselaer Polytechnic Institute (RPI).

Michael Spencer, Ph.D. '00, is Assistant Professor in the Department of Aeronautics and Astronautics at Naval Postgraduate School in Monterey, CA

Jeanette Epps, Ph.D. '00, is Senior Project Engineer at Ford Motor Company. She played a key role in the unveiling of the new Ford Thunderbird.

Now you have a new and convenient way to stay in touch with fellow alumni and your alma mater through the Terp Alumni Network.

This FREE online community features an Alumni Directory to help you locate old friends and Permanent Terp Email so that your friends can also find you. To register and for more detials, visit http://www.alumni.umd.edu

A Letter From the Field...

I started working for the Naval Sea Systems Command (NAVSEA) just after graduation. I'm in an engineering management training program in which participants spend two and a half years doing four to six month rotations in different parts of the Navy. While in Washington, D.C., I've worked on various efforts, including two different multi-billion dollar ship construction programs, and an $8 billion Navy-wide IT outsourcing initiative.

As part of my training I also worked at a naval shipyard in the Seattle area. I spent most of my time there working on ship drawings, writing work instructions for mechanics, trouble-shooting repairs, and helping with a hydraulic line redesign for an aircraft carrier catapult. When I wasn't at work I was taking advantage of the great summer weather and spectacular hiking out in western Washington.

I followed those four months with another five at a shipyard in San Diego. This time, however, I was working at a commercial shipyard which was contracted to do work on Navy ships. I was part of a small detachment of government personnel who supervise several-month-long overhauls. I spent a lot of my time walking around the ships to make sure that work was getting completed on time and up to specifications. I also had to help resolve technical questions the contractor had and approve additional work that went beyond the scope of our original contract. And, as you can imagine, San Diego was a pretty great place to spend the winter.

Respectfully,
Chris MacDonald, BS '99

We would like to congratulate our recent graduates for their accomplishments and continuing pursuits:

IN THE FIELD

Matthew Ashmore, BS '01, and ***Jessica Garzon*** BS '01, Swales in support of NASA Goddard

Michael Renda, BS '01, Boeing in Seattle, WA in their Structural Design Group

Benjamin Moses, BS '01, Perk & Elmer in Beltsville, MD

Emmie Helms, BS '01, Lincoln Labs in Boston, MS, and is attending graduate school at MIT

Eric Simon, BS '01, NASA Goddard

Aurora Labrador, BS '01, BS '01, Honeywell, in support of NAGoddard

Richard Delaney, BS '01, Patuxent River Naval Air Station

Navid Ghanadan, BS '01, General Electric in Cinncinati, OH, in the Jet Engine Division

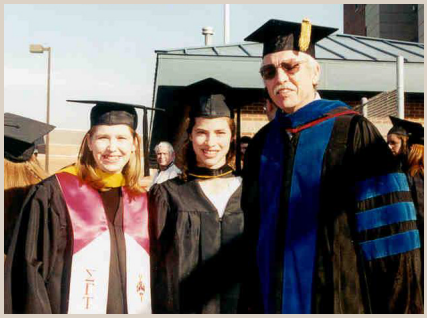
Iya Massah, BS' 01, Pratt & Whitney based in East Hartford, Connecticut, as a Repair Development Engineer

Monica Atzert, BS '01, AAI in Unmanned Aerial Vehicle division

Obibobi Ndu, BS '01, FAA, Washington, D.C.

Cristin Sawin, BS '01, MPC Products, Chicago, IL, in Aerospace Applications, Motors and Actuators

Jeff Jensen, BS '01, ***Josh Wolk***, BS '01, Lockheed Martin, Virginia



Kisa Christensen, BS '01, GKN-Engage in Melbourne, Australia

Devon Stewart, BS '01, spending a year abroad in Spain before returning to graduate school

IN THE SERVICE

Joshua Ellithorpe, BS '01, serving a Commission in the US Air Force

Roderick Morris, BS '01, US Air Force

Prasobchaok Poonsong, BS '01, returned to Thailand to serve in the military and will return for graduate school

IN GRADUATE SCHOOOL

University of Maryland, College Park

Daniel Barkmeyer, BS '01, and ***Daniel Hoult***, BS '01, working with Dr. Lewis

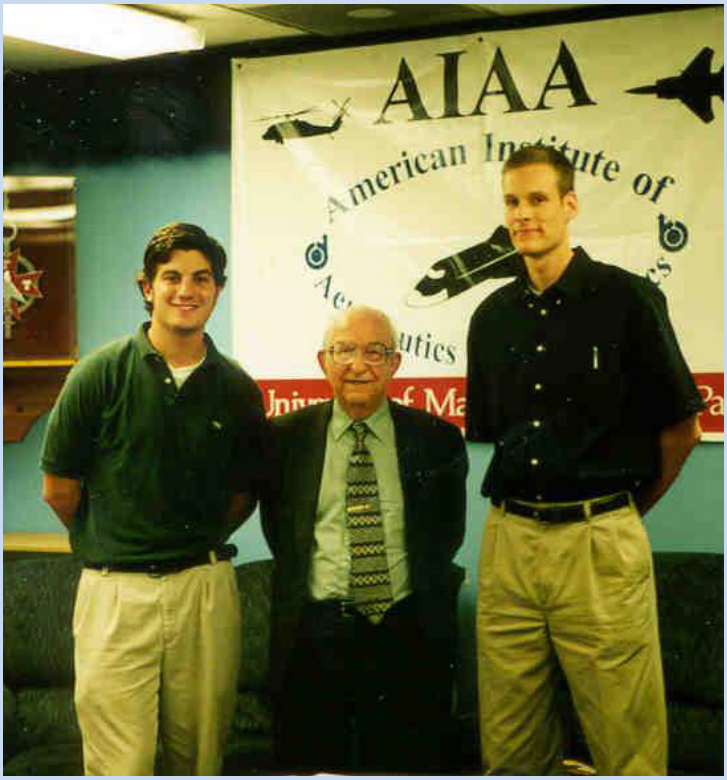
Raquel Jarabek, BS '01, on fellowship and working at NASA Goddard

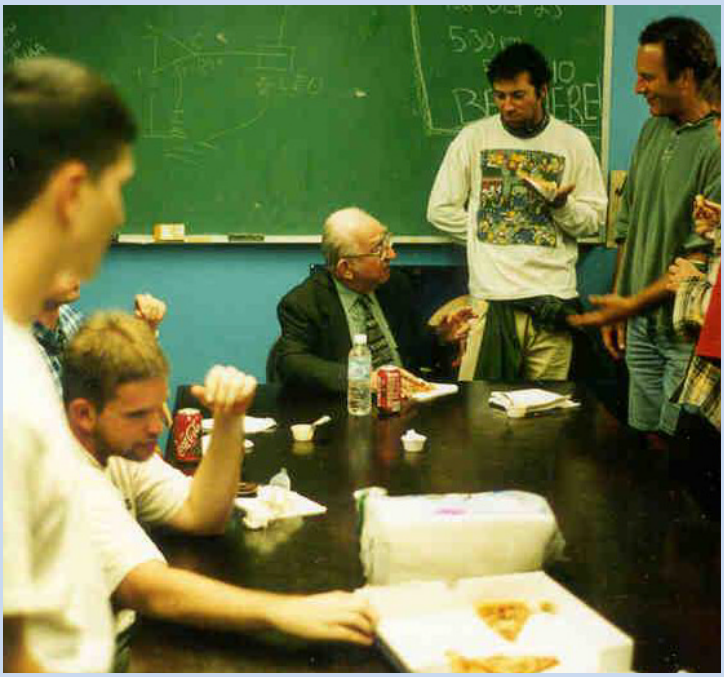
Chia-Wei "Brian" Kuo, BS '01, working with Dr. Schmidt in Acoustics

Nicholas Rosenfeld, BS '01, working with Dr. Wereley in magnitude fluids

University of Illinois

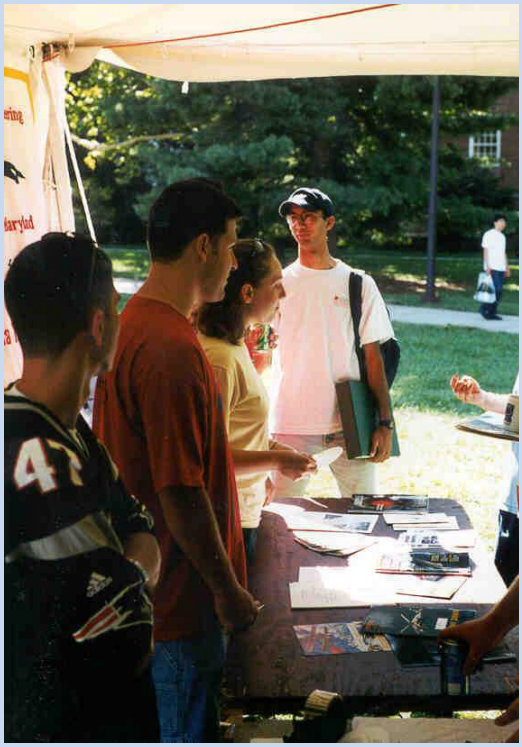
Glen Dimock, BS '01, is researching anti-icing systems for aircraft





Dr. Ron Davies, Curator in the Aeronautics Department of the National Air and Space Museum, spoke with students at the October AIAA membership meeting. His lecture focused on the future of air transportation. Pictured to the left are AIAA Vice President Dan King, Dr. Ron Davies, and AIAA President Matt MacKusick.

AIAA and Sigma Gamma Tau members prepare for the Clark School of Engineering Competition held in April at Maryland Day 2001.



Members of Sigma Gamma Tau and AIAA speak with students at the Engineering Welcome Back Picnic sponsored by the Engineering Student Council, held September 5th on the front lawn of GLM Hall. The Picnic was a collection of Engineering Student Societies where they were able to speak to new engineering students.

A. JAMES CLARK SCHOOL OF ENGINEERING

Department of Aerospace Engineering

Alumni Survey

This questionnaire asks for your reflections on your experiences at the A. James Clark School of Engineering Department of Aerospace Engineering. Your responses will be used to improve programs and practices for current and future students. Responses will be used for statistical purposes only and will be held strictly confidential. Please return the survey to the Department and we thank you for your support.

Year of Graduation: _____

Please rate the following according to the Importance to your professional success on a scale of 1 to 5, where 1 = Not Important and 5 = Very Important.

Knowledge and Abilities

- Basic Physics _____
- Chemistry _____
- Engineering-Discipline Specific _____
- Computer Skills for Engineering _____
- Current Technologies _____
- Broad, Well-Rounded Education _____
- Global Perspective _____

Skill & Experience

- Problem Solving _____
- Creative Thinking _____
- Writing _____
- Oral Presentation _____
- Interpersonal Communications _____
- Teamwork _____
- Practical Experience _____
- Management _____

Habits

- Engineering Ethics _____
- Professionalism _____
- Social Awareness _____
- Lifelong Learning _____
- Appreciation for Diversity _____

How helpful were each of the following aspects of your engineering education in securing your first position? (1=Not Done; 2=Not At All Helpful; 3=Somewhat helpful; 4=Very Helpful)

- Course work in your major field _____
- Course work in fields outside your major _____
- Participation in research projects in engineering _____
- Field experience (e.g., internships, Co-op, etc.) _____
- Student employment related to engineering _____
- Involvement in extracurricular activities _____
- Faculty/staff in my major field _____
- Faculty/staff outside my major field _____
- College career services _____

Did you ever have any of the following pre or early professional experiences while you were enrolled at the Clark School? (Check all that apply)

- Engineering Job (internship, summer, PT, etc.) _____
- Cooperative Education (Co-op) _____
- Involvement in undergraduate research _____
- Membership in Engineering student society _____
- Mentored by Engineering faculty member _____

To what degree did these experiences impact your ability to: (1=None; 2=Very Little; 3=Some; 4=A Lot; 5=A Great Deal)

- Solve problems _____
- Apply the knowledge and skills in class _____
- Improve communication with others _____
- Develop time management skills _____
- Make contacts with practicing engineers _____
- Understand what is required to perform as an engineer _____
- Obtain first job _____

In your first position after college, how often do/did you use the following skills? Please use a scale of 1 to 5, 1=Rarely, 5=Routinely.

- Engineering course work knowledge _____
- Problem solving skills _____
- Mathematical skills _____
- Modeling skills (numerical or physical) _____
- Computer skills _____
- Lab/instrumentation skills _____
- Oral communication skills _____
- Written communication skills _____
- Leading others effectively _____
- Effective teamwork/interpersonal skills _____

To what extent is your current job related to your engineering major at the Clark School?

- Directly related _____
- Somewhat related _____
- Not related, but is not important to me _____
- Not related, but I would like a job related to engineering _____

AEROCONTACT is published several times a year for alumni and friends of the Department of Aerospace Engineering at the A. James Clark School of Engineering.

Your alumni news and comments are welcome. Please send them to:
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